

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference H0498.70287	FOR FURTHER ACTION <small>see Form PCT/ISA/220 as well as, where applicable, Item 5 below.</small>	
International application No. PCT/US2007/024126	International filing date (day/month/year) 19/11/2007	(Earliest) Priority Date (day/month/year) 22/11/2006
Applicant PRESIDENT AND FELLOWS OF HARVARD COLLEGE		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☒ Certain claims were found unsearchable (See Box No. II)

3. ☐ Unity of invention is lacking (see Box No. III)

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☐ the text is approved as submitted by the applicant
☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1
☒ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☐ as selected by this Authority, because this figure better characterizes the invention
- b. ☐ none of the figures is to be published with the abstract

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Box No. IV Text of the abstract (Continuation of Item 5 of the first sheet)

The present invention generally relates to nanoscale wire devices and methods for use in determining analytes suspected to be present in a sample. The invention provides a nanoscale wire that has improved sensitivity, as the carrier concentration in the wire is controlled by an external gate voltage, such that the nanoscale wire has a Debye screening length that is greater than the average cross-sectional dimension of the nanoscale wire when the nanoscale wire is exposed to a solution suspected of containing an analyte. This Debye screening length (λ) associated with the carrier concentration (p) inside nanoscale wire is adjusted by adjusting the gate voltage applied to an FET structure, such that the carriers in the nanoscale wire are depleted.

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A. CLASSIFICATION OF SUBJECT MATTER
INV. G01N27/414

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, COMPENDEX, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/117659 A1 (LIEBER CHARLES M [US] ET AL) 29 August 2002 (2002-08-29) cited in the application	1,2, 6-19,27, 29-32
Y	paragraphs [0063], [0091]; figures 14a,14b	20-26
X	WANG W U ET AL: "Label-free detection of small-molecule-protein interactions by using nanowire nanosensors" PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA, NATIONAL ACADEMY OF SCIENCE, WASHINGTON, DC.; US, vol. 102, no. 9, 1 March 2005 (2005-03-01), pages 3208-3212, XP002478997 ISSN: 0027-8424	27,29-32
Y	page 3208, right-hand column, paragraph 2 page 3209, right-hand column, paragraph 2	20-26
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

26 September 2008

Date of mailing of the international search report

02/10/2008

Name and mailing address of the ISA/

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ZHENG G ET AL: "Multiplexed electrical detection of cancer markers with nanowire sensor arrays" NATURE BIOTECHNOLOGY, NATURE PUBLISHING GROUP, NEW YORK, NY, US, vol. 23, no. 10, 1 October 2005 (2005-10-01), pages 1294-1301, XP002414583 ISSN: 1087-0156 page 1299, right-hand column, last paragraph - page 1300, left-hand column, paragraph 4; figures 1-3	27,29-32
X	WO 2006/107312 A (HARVARD COLLEGE [US]; WANG WAYNE [US]; CHEN CHUO [US]; LIN KENG-HUI [U] 12 October 2006 (2006-10-12)	27,29-32
A	page 5, lines 12-20; claims 13-27 page 37, line 3 - page 38, line 20	1,2
A	CUI YI ET AL: "Diameter-controlled synthesis of single-crystal silicon nanowires" APPLIED PHYSICS LETTERS, AIP, AMERICAN INSTITUTE OF PHYSICS, MELVILLE, NY, vol. 78, no. 15, 9 April 2001 (2001-04-09), pages 2214-2216, XP012027731 ISSN: 0003-6951 abstract; figure 2	1,27
A	PATOLSKY FERNANDO ET AL: "Nanowire-based biosensors" ANALYTICAL CHEMISTRY, AMERICAN CHEMICAL SOCIETY, COLUMBUS, US, vol. 78, no. 13, 1 July 2006 (2006-07-01), pages 4260-4269, XP002470513 ISSN: 0003-2700 the whole document	6-9

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 3-5,28

Claims 3-5 and 28 do not clearly define any searchable subject-matter, because they relate to methods and products having a given desired effect, namely a very low detection limit, see PCT Guidelines 9.21.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2)PCT declaration be overcome.

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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 3-5, 28
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This international Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002117659 A1	29-08-2002	US 2006054936 A1	16-03-2006
		US 2008211040 A1	04-09-2008
		US 2007158766 A1	12-07-2007
WO 2006107312 A	12-10-2006	US 2007264623 A1	15-11-2007